

---

# Public Reporting of Performance

---

## Performing Well on Nursing Home Report Cards: Does It Pay Off?

*Jeongyoung Park, R. Tamara Konetzka, and Rachel M. Werner*

---

**Objective.** To examine whether high performance or improvement on quality measures leads to economic rewards for nursing homes in the presence of public reporting.

**Data Sources.** Data from 6,286 freestanding Medicare-certified nursing homes between 1999 and 2005 were identified in Medicare Cost Reports, Minimum Data Set, and Online Survey and Certification Reporting System.

**Study Design.** Using a facility-level fixed-effects model, the effect of public reporting on financial performance was measured by comparing each of four financial outcomes (revenues, expenses, operating, and total profit margins) before (1999–2002) to after (2003–2005) public reporting was initiated. The effects were estimated separately by level of performance and improvement over time.

**Principal Findings.** Facilities that improved on publicly reported performance had increased revenues and higher profit margins after public reporting, mainly through increased Medicare admissions. High-scoring facilities showed similar patterns, though differences were not statistically significant.

**Conclusions.** Providers that improve their performance under public reporting may receive a return on their investment in quality improvement. This supports the business case for public reporting.

**Key Words.** Public reporting, quality of care, nursing homes, financial performance

---

Improving quality of care in nursing homes is a national priority as evidenced by the recent widespread adoption of market-based quality improvement initiatives, such as public reporting and pay-for-performance. In November of 2002, the Centers for Medicare and Medicaid Services (CMS) began publicly reporting the quality of care at every Medicare- and Medicaid-certified nursing home in the United States through their website, Nursing Home Compare (NHC). The website provides general information about nursing home characteristics, nurse staffing information, clinical quality measures, and inspection results. Publicly reporting quality information may improve quality of care in

two ways. First, the reported information is expected to assist consumers in choosing high-quality providers, thus increasing the number of consumers choosing high-quality providers. Second, with increased consumer attention to quality and increased competition based on quality, providers may focus on improving the quality of care they deliver or potentially gain market share. Thus, in theory, report cards might be an effective policy tool to promote high-quality care.

Empirical evidence on the effects of NHC is still emerging. Studies of the effect of NHC on nursing home quality have used a range of research designs from simple pre-post trends to difference-in-differences models using a control group. Regardless of the methods used, most of these studies were consistent with each other in that they showed modest improvement in some but not all reported measures of quality in response to NHC (Zinn et al. 2005; Castle, Engberg, and Liu 2007; Mukamel et al. 2008; Werner et al. 2009). Far fewer studies have looked at consumer response, but one recent survey indicated that 12 percent of new nursing home residents or their families consulted the NHC website when making their decision and most were able to understand the information (Castle 2009). Numerous questions about mechanisms, sustainability, and indirect effects remain unanswered.

While the main objective of public reporting is to improve quality of care, public reporting may have indirect financial consequences for providers as well; without these, the sustainability of quality improvements in response to public reporting is difficult to imagine. Within the nursing home literature, a few studies have attempted to examine whether quality is associated with better financial performance, generally finding that higher quality facilities also have better financial performance as measured by profit margins and other standard indicators (Weech-Maldonado, Neff, and Mor 2003; Castle 2005). However, the nature of the relationship between quality of care and financial performance is still uncertain. Most important, these studies were conducted before the release of public report cards. Little is known about the financial implications of quality improvement under public reporting.

---

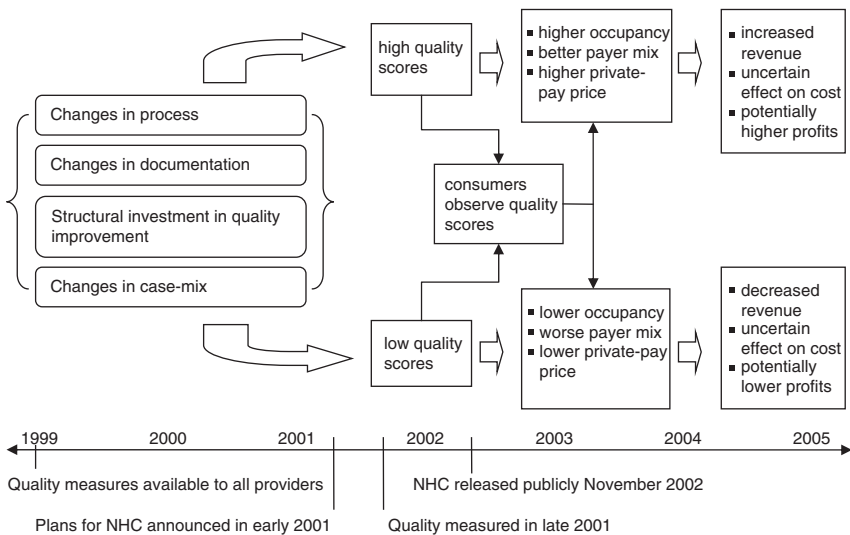
Address correspondence to Jeongyoung Park, Ph.D., Health Services Researcher, American Board of Internal Medicine, 510 Walnut Street, Suite 1700, Philadelphia, PA 19106; e-mail: [jjpark@abim.org](mailto:jjpark@abim.org). R. Tamara Konetzka, Ph.D., Assistant Professor, is with the Department of Health Studies, University of Chicago, Chicago, IL. Rachel M. Werner, M.D., Ph.D., Assistant Professor, is with the Center for Health Equity Research and Promotion, Philadelphia VAMC, Division of General Internal Medicine, University of Pennsylvania, Philadelphia, PA.

## CONCEPTUAL FRAMEWORK

In the absence of publicly reported quality information, nursing homes may invest in quality only to the extent that it improves quality that is easily observed by consumers. Under public reporting, however, if reported quality measures successfully differentiate providers on the basis of performance, nursing homes that score well on publicly reported measures may be financially rewarded, creating an incentive for increased attention to quality.

Figure 1 presents a conceptual model of provider behavior leading to differential financial outcomes under public reporting. Starting in 1999 (and earlier for many nursing homes), nursing home providers had access to the quality measures that would eventually be reported. In 2001, plans for NHC were announced, and quality measurement began in late 2001. During this pre-NHC period, providers decided on and implemented a strategy in response to the policy. Several strategies are plausible as follows: no response; changes in care processes so that reported measures get more attention; changes in documentation so that reported measures look better; and investment in structural improvements to improve quality, such as increased quality or quantity of staffing. (Selection of low-risk residents is a fourth

Figure 1: A Conceptual Model of Nursing Home Provider Response to Nursing Home Compare (NHC)



possible strategy, but current evidence in the long-stay nursing home sector indicates very little selection effect (Mukamel et al. 2009). Lack of ability to select residents is also consistent with the fact that nursing home markets have become increasingly competitive in recent decades (Grabowski 2001). These strategies may or may not be associated with increased cost, as focusing more attention on reported measures may simply represent a diversion of resources as opposed to true investment in quality. No effect on revenue is expected during this period, as quality scores are not yet revealed. Thus, the overall effect of implementing these strategies on profit margins in the pre-NHC period is expected to be neutral or negative.

Once NHC scores are released in late 2002, our conceptual model posits that consumers increasingly choose nursing homes that score well on NHC. Thus, occupancy rates at these facilities are improved. In addition, payer mix may improve at high-performing facilities, as higher-margin Medicare and private-pay residents often have greater choice in placement relative to low-margin Medicaid residents who have to take a bed wherever it is available. High-performing nursing homes may also be able to increase private-pay price as demand for their services increases. During the post-NHC period, the effect of these changes on cost is once again ambiguous: costs may increase if investment in quality improvement is sustained or if more high-acuity Medicare residents are attracted; costs may decrease if the investment in quality improvement was not sustained. However, the effect on revenues should be unambiguously positive for facilities that do well on NHC relative to those that score poorly. Our first hypothesis therefore is that nursing homes that perform well on NHC will increase revenues under public reporting. Profit margins will increase if the positive effect on revenues outweighs any increase in cost.

If quality pays for nursing homes, both high-scoring facilities and those with significant improvement on reported quality measures may benefit from public reporting through increased market share. Although consumers may be aware that a facility is high quality before report cards, having a facility score well can serve as objective confirmation. For facilities that are not perceived as high quality in the absence of NHC, a high score may constitute news (or new information), in which case consumers may newly consider a facility as a high-quality option. For facilities that did not perform as well before public reporting but improved performance once the policy was implemented, we may also expect the high score to function as “news.” That is, although the pre-public-reporting scores are unobservable to consumers, consumers may have some prior belief about the level of quality at a given facility based on other factors, and an improved score relative to this prior

belief attracts new customers. While testing consumer response directly is beyond the scope of this study of provider performance, these potential scenarios lead us to test separately whether scoring well on reported quality and improvement in reported quality lead to changes in financial performance. Thus, our second hypothesis is that nursing homes that improve on NHC measures are likely to increase revenues under public reporting. Again, profit margins will also increase if the increased revenues outweigh increased cost.

Examining this topic is important because it is often stated that providers are skeptical about the impact of report cards (Mukamel et al. 2007). While providers appear to be reacting to NHC with a modest level of quality improvement, the long-run success of a public-reporting policy depends on continued efforts to improve quality. Nursing homes may want solid evidence that quality pays before making the continued investment that may be necessary to improve performance (Arling, Job, and Cooke 2009). This expectation is particularly strong in the nursing home industry, given that the majority of nursing homes are owned or operated by for-profit companies (Norton 2000). Continued efforts to improve reported quality are unlikely unless the “business case” for scoring well on NHC reveals that providers may reap financial rewards.

## METHODS

### *Data*

The data for this study came from three different sources, which are as follows: (1) Medicare Cost Reports; (2) Minimum Data Set (MDS); and (3) Online Survey and Certification Reporting System (OSCAR). The time period of this study is from 1999 through 2005, spanning 2002 when NHC was released.

Nursing home financial performance was measured using Medicare Cost Reports. All Medicare-certified skilled nursing facilities (SNFs) are required to file cost reports annually in order to receive payments for treating Medicare residents. The Medicare Cost Reports contain facility-level information such as cost and charges by cost center (in total and for Medicare), Medicare settlement data, and financial statement data. Although some data-quality concerns have been documented (Kane and Magnus 2001), lack of viable alternatives at the national level makes Medicare Cost Reports the primary national database of financial information of Medicare-certified providers (Bazzoli et al. 2007).

Nursing home quality was measured using the MDS. The MDS contains detailed resident-level clinical data collected at regular intervals for every resident in all Medicare- or Medicaid-certified nursing homes. These data contain information on residents' health, physical functioning, mental status, and psycho-social well-being and are used by nursing homes to assess the needs and develop a plan of care unique to each resident; they are also used by the CMS to calculate Medicare prospective reimbursement rates and are the source for the quality measures reported on NHC (Mor et al. 2003). While some of these measures have been subject to some controversy and are subject to the same limitations as all quality measures—that what is measurable may not reflect the most important aspects of quality, for example—our intent is not to evaluate quality but rather to assess whether performance on these measures as reported affects financial performance. We use these data to calculate 15 facility-level publicly reported quality measures both before and after NHC was launched.

We obtained facility characteristics from the OSCAR data. These data are collected every 9–15 months from state inspections of all federally certified Medicare and Medicaid nursing homes in the United States and include about 96 percent of the nation's nursing homes.

Facility-level quality measures from the MDS were linked to the Medicare Cost Reports and the OSCAR surveys from the same year. In cases where facilities had either more than one or zero inspections in a given year, the OSCAR survey results closest to the first day of the fiscal year used in the Medicare Cost Reports were linked.

### *Study Sample*

We included all Medicare-certified freestanding SNFs. Hospital-based nursing facilities were excluded as they are very different in terms of resident severity, care practice, and accounting system (i.e., allocation of hospital overhead costs to the SNF units). The initial dataset merged from three sources included 9,164 freestanding SNFs. We excluded 1,490 facilities with an absolute value of operating or total profit margins  $> 100$ ; with negative total revenues or expenses; or with incomplete information on key covariates. We also excluded 153 facilities that were never included in NHC, generally small facilities with too few residents who qualify for the denominator of quality measures (fewer than 30 eligible cases for each chronic measure and 20 eligible cases for a postacute measure). In addition, to ensure comparable quality and financial data, we further excluded 1,235 facilities that were not consistently in the

Medicare Cost Reports from 2002 to 2005. In the final sample, only 473 facilities had missing quality information in one or more years of the data and the average number of missing quality measures per facility was 1.3. A total of 42,542 facility-year observations from 6,286 facilities participating in NHC were included in the analysis.

### *Financial Performance*

We used four standard measures of financial performance indicators: net resident revenues, total operating expenses, operating profit margin, and total profit margin. Net resident revenues are the total net resident revenues after the deduction of contractual adjustments, allowance for bad debts, and charity care from the gross routine and ancillary services revenues. Total operating expenses include the direct, indirect, and ancillary costs associated with resident care. Total and operating profit margins are frequently used as a measure of financial performance in health services research (McCue, Mark, and Harless 2003; Weech-Maldonado, Neff, and Mor 2003). Total profit margin was calculated by dividing net income (what remains after subtracting total expenses from total health care revenues) from both operations and nonoperations (e.g., donations and gains or losses on investments in securities, real estate, or operating subsidiaries) by total health care revenues. The ratio is expressed as a percentage and reflects excess income from both operations and nonoperations. Operating profit margin is similar to total profit margin but only uses net income related to resident care as a proportion of operating (or net patient) revenues. Nursing homes may improve profit margins by generating higher revenues or decreasing costs or both. The annual consumer price index from the U.S. Bureau of Labor Statistics was used to convert all dollar amounts to constant 2005 dollars. The natural logs of revenues and expenses were used in the analysis given the skewed nature of financial variables.

### *Quality Measures*

We focus on the clinical quality measures included in NHC, as these were the focus of the public-reporting effort and other indicators were generally available to the public before 2002. However, we repeated our analyses using nurse staffing and deficiencies (also reported on NHC) to indicate quality and found results to be consistent with those based on the clinical measures. We applied the technical definitions provided by CMS (Morris et al. 2003) to calculate 15 quality measures (12 chronic and 3 postacute) that are currently publicly re-

ported on NHC. The initial report cards included 10 clinical quality measures and it was subsequently revised and expanded (Mukamel et al. 2008). Among 19 currently reported quality measures, we excluded two chronic (percent of long-stay residents with influenza and pneumococcal vaccination) and two postacute care (percent of short-stay residents with influenza and pneumococcal vaccination) measures most recently added to report cards and therefore lacking sufficient years of data. Each measure was calculated quarterly over three (for chronic) or two (for postacute) quarters of data, and then aggregated by year and facility. The 12 chronic and the 3 postacute care quality measures in this study are listed in Table 1.

### *NHC Indicators*

The effect of public reporting on financial performance was measured using a pre/post indicator variable for NHC within each quality stratum. We thus compared financial performance in the post-public-reporting period (2003–2005) to the pre-public-reporting period (1999–2002). A sensitivity analysis was conducted using individual year indicators, but as these results led to similar conclusions, we do not present them.

### *Covariates*

Several facility- and market-level time-varying variables were used to control for changes over time. Facility characteristics included ownership, whether the facility is part of a chain, and bed size. The Herfindahl–Hirschman index was included as a proxy for nursing home market competition in each county, as competitiveness of the market is likely to affect response to public reporting. While several of these control variables vary little over time and thus their main impact is absorbed in the facility-fixed effects, we nonetheless (and conservatively) include them to capture any effects associated with their variation over time.

### *Empirical Analysis*

Our main analysis estimates the effect of NHC on financial performance using separate regressions for each financial outcome. Rather than model financial performance directly as a function of NHC performance—which could give a biased coefficient due to endogeneity bias if a reciprocal relationship exists between these two factors—we instead model the pre–post differences in financial performance stratifying by NHC performance and improvement. Although this approach cannot eliminate endogeneity bias, it lessens it. To control for unobserved facility specific heterogeneity, we use a facility-level fixed-effects



Table 1: Average Facility Characteristics of Study Sample, 1999–2005

|  | Overall   |                    |  | I. By Reported Score |           |           | II. By Improvement |           |           |
|--|-----------|--------------------|--|----------------------|-----------|-----------|--------------------|-----------|-----------|
|  |           |                    |  | High                 | Middle    | Low       | Improved           | No Change | Worse     |
|  | Mean      | Standard Deviation |  | Mean                 | Mean      | Mean      | Mean               | Mean      | Mean      |
| Financial performance                              |           |                    |  |                      |           |           |                    |           |           |
| Net resident revenues (U.S.\$ in 2005)             | 8,200,110 | 19,700,000         |  | 8,149,017            | 8,405,780 | 7,041,154 | 8,412,762          | 8,206,766 | 7,388,145 |
| Total operating expenses (U.S.\$ in 2005)          | 7,896,810 | 7,075,292          |  | 7,919,005            | 8,061,937 | 6,901,513 | 8,215,950          | 7,846,288 | 7,284,245 |
| Operating profit margin                            | −0.96     | 12.20              |  | 0.13                 | −1.02     | −1.70     | −0.99              | −0.90     | −1.39     |
| Total profit margin                                | 1.51      | 10.93              |  | 2.36                 | 1.45      | 1.00      | 1.58               | 1.53      | 1.09      |
| 15 MDS quality measures                            |           |                    |  |                      |           |           |                    |           |           |
| % Long-stay residents                              |           |                    |  |                      |           |           |                    |           |           |
| Increased need for help with daily activities      | 11.17     | 5.29               |  | 11.15                | 11.18     | 11.12     | 11.28              | 11.08     | 11.63     |
| Moderate to severe pain                            | 6.69      | 5.34               |  | 4.95                 | 6.69      | 8.50      | 6.63               | 6.74      | 6.46      |
| Pressure sores (high risk)                         | 14.22     | 6.99               |  | 12.66                | 14.38     | 14.88     | 14.13              | 14.25     | 14.32     |
| Pressure sores (low risk)                          | 3.01      | 3.55               |  | 2.36                 | 3.04      | 3.49      | 2.97               | 3.00      | 3.19      |
| Physically restrained                              | 8.35      | 8.08               |  | 7.63                 | 8.45      | 8.46      | 8.38               | 8.34      | 8.36      |
| Depressed or anxious                               | 16.20     | 6.31               |  | 15.43                | 16.12     | 17.43     | 16.28              | 16.17     | 16.16     |
| Lose control of their bowels or bladder (low risk) | 47.90     | 13.70              |  | 47.34                | 48.00     | 47.89     | 48.05              | 47.85     | 47.85     |
| Catheter inserted and left in their bladder        | 5.82      | 3.82               |  | 5.32                 | 5.88      | 6.01      | 5.84               | 5.82      | 5.74      |
| In bed or in a chair                               | 4.85      | 5.32               |  | 4.17                 | 4.87      | 5.44      | 4.81               | 4.87      | 4.83      |
| Ability to move in/around their room got worse     | 15.57     | 7.81               |  | 16.17                | 15.48     | 15.50     | 15.75              | 15.45     | 16.13     |
| Urinary track infection                            | 8.51      | 4.65               |  | 8.09                 | 8.48      | 9.12      | 8.56               | 8.49      | 8.54      |
| Lose too much weight                               | 10.01     | 4.74               |  | 9.40                 | 10.05     | 10.40     | 10.00              | 9.98      | 10.37     |

continued

Table 1. Continued

|                                   | I. By Reported Score |                    |       |        | II. By Improvement |          |           |       |
|-----------------------------------|----------------------|--------------------|-------|--------|--------------------|----------|-----------|-------|
|                                   | Overall              |                    | High  | Middle | Low                | Improved | No Change | Worse |
|                                   | Mean                 | Standard Deviation | Mean  | Mean   | Mean               | Mean     | Mean      | Mean  |
| % Short-stay residents            |                      |                    |       |        |                    |          |           |       |
| Delirium                          | 3.79                 | 4.91               | 2.10  | 3.73   | 5.88               | 3.90     | 3.76      | 3.75  |
| Moderate to severe pain           | 22.78                | 13.60              | 16.58 | 22.83  | 28.88              | 22.19    | 22.97     | 23.03 |
| Pressure sores                    | 26.85                | 13.79              | 20.85 | 26.98  | 32.33              | 26.37    | 27.03     | 26.76 |
| Facility                          |                      |                    |       |        |                    |          |           |       |
| For-profit                        | 0.75                 | 0.44               | 0.78  | 0.74   | 0.72               | 0.74     | 0.75      | 0.76  |
| Chain                             | 0.63                 | 0.48               | 0.65  | 0.63   | 0.66               | 0.62     | 0.64      | 0.67  |
| Certified beds                    | 129                  | 69                 | 129   | 132    | 116                | 134      | 129       | 119   |
| Market                            |                      |                    |       |        |                    |          |           |       |
| Herfindahl–Hirschman index (0, 1) | 0.22                 | 0.26               | 0.21  | 0.22   | 0.28               | 0.21     | 0.23      | 0.24  |
| No. of observation                | 42,542               |                    | 5,510 | 31,657 | 5,375              | 10,269   | 29,343    | 2,930 |
| No. of facility                   | 6,286                |                    | 812   | 4,672  | 802                | 1,507    | 4,337     | 442   |

model where each financial performance ( $F_{it}$ ) is a function of a NHC indicator ( $\text{NHC}_t$ ), time-varying covariates ( $X_{it}$ ), and SNF fixed effects ( $\eta_i$ ).

$$F_{it} = \beta(\text{NHC}_t) + \gamma X_{it} + \eta_i + \varepsilon_{it}$$

where the subscript  $i$  indexes the nursing home and  $t$  indexes the pre- versus post-NHC period. The SNF fixed-effects control for unmeasured factors that may lead to consistently better financial performance in one facility compared with another, such as facility culture, the competence of management, or the affluence of the neighborhood. Fixed effects at the facility level also control for time-invariant factors at the market and state level, such as differences in state policies. The estimations were stratified by the level of performance on reported quality scores and improvement on these scores over time.

We defined facilities as high scoring ( $N = 812$ ) or improved ( $N = 1,507$ ) if all 15 reported quality measures were above the median each year after NHC or improved from before the launch of NHC to after its launch, respectively. Conversely, we defined facilities that were low scoring ( $N = 802$ ) or worse ( $N = 442$ ) as those where all 15 quality measures were below the median each year after NHC or worsened from before to after public reporting, respectively. For simplicity, the remaining facilities (those were neither high nor low scoring) were categorized as middle scoring ( $N = 4,672$ ), and if they did not consistently improve or worsen on all 15 quality measures, we defined them as no change ( $N = 4,337$ ). Modest variations on these definitions produced similar results.

To explore the potential pathways of our main effect, we then conduct a full mediation analysis, using the same estimation methods to assess (1) whether performance on NHC affects occupancy, payer mix, and patient-days for each type of payer; and (2) whether inclusion of these factors in our main regressions substantially reduces the magnitude of our NHC effect, indicating that the factor is a potential mediator or mechanism through which our hypothesized effects are realized. Although we hypothesize that changes in private-pay price may also mediate effects, we do not test it due to lack of data on private-pay price.

## RESULTS

### *Descriptive Results*

Table 1 presents descriptive statistics for financial and quality measures as well as key covariates, separated by level of performance and improvement over

time. By definition, high-scoring facilities had better scores on the 15 quality measures than low-scoring facilities. However, there was no significant difference in quality measures by improvement, that is, facilities that improved were found across the range of absolute quality scores. Both high-scoring facilities and those with improvement experienced better financial performance reflected by both operating and total margins, compared with their counterparts.

### *Main Results*

Table 2 shows main results of the impact of public reporting on financial performance. Generally, high-scoring nursing homes and those that improved had better financial performance in the post-NHC period compared with facilities that did not perform as well, as measured by larger increases in revenues. However, as indicated in the difference-in-differences tests, these differences from group to group were only statistically different in the regressions stratified by improvement. Neither high-scoring facilities nor those that improved exhibited cost savings, consistent with the expectation that quality improvement requires some investment of resources. The magnitude of increase in expenses appears larger for high-scoring and improving facilities, though differences were not statistically distinguishable. The net effect on finances, measured by operating and total profit margins, is that facilities that improve on NHC measures also improve in profitability relative to facilities that do not improve on NHC measures. The net results on operating margins for high-scoring relative to middle- or low-scoring facilities are similar in pattern to the improvement results, but nonsignificant. The pattern for total profit margins is less clear. Overall, the empirical results support that, as hypothesized, doing well on NHC—and especially improving on NHC measures—is associated with increased revenues and operating margins.

In a subanalysis (not shown), we also found that public reporting differentially affected financial performance among improved facilities based on the absolute level of performance. Better financial performance among facilities that improved was mostly driven by facilities where improvement led them to be ranked as high-quality or middle-quality facilities, while those that improved but remained low quality did not exhibit improvements in financial performance. Thus, while improvement is good, the absolute level of quality still matters. This threshold effect raises the concern that low-scoring facilities may find it increasingly difficult to respond to quality improvement incentives over time, as substantial improvement is needed before financial rewards are experienced.

Table 2: Impacts of Nursing Home Compare (NHC) on Financial Performance

|                    | I. By Reported Score               |                  |                  |   |             |
|--------------------|------------------------------------|------------------|------------------|---|-------------|
|                    | I-1. Stratified ( $\beta$ on NHC)  |                  |                  | I-2. Difference-in-Differences ( $p$ -Value)  |             |
|                    | High (H)                           | Middle (M)       | Low (L)          | H versus M                                    | M versus L  |
| Ln(revenues)       | 0.101 (0.006)***                   | 0.092 (0.003)*** | 0.086 (0.006)*** | 0.232   | 0.106       |
| Ln(expenses)       | 0.100 (0.006)***                   | 0.093 (0.003)*** | 0.085 (0.007)*** | 0.284   | 0.117       |
| Operating margin   | 0.590 (0.339)*                     | 0.241 (0.136)*   | 0.236 (0.355)    | 0.317   | 0.392       |
| Total margin       | 0.915 (0.315)***                   | 0.756 (0.131)*** | 0.961 (0.317)*** | 0.697   | 0.982       |
| II. By Improvement |                                    |                  |                  |   |             |
|                    | II-1. Stratified ( $\beta$ on NHC) |                  |                  | II-2. Difference-in-Differences ( $p$ -Value) |             |
|                    | Improved (I)                       | No Change (NC)   | Worse (W)        | I versus NC                                   | NC versus W |
|                    |                                    |                  |                  |   |             |
| Ln(revenues)       | 0.104 (0.005)***                   | 0.089 (0.003)*** | 0.083 (0.009)*** | 0.007   | 0.022       |
| Ln(expenses)       | 0.097 (0.004)***                   | 0.092 (0.003)    | 0.088 (0.008)    | 0.229   | 0.225       |
| Operating margin   | 0.932 (0.242)***                   | 0.109 (0.143)    | – 0.215 (0.482)  | 0.003   | 0.022       |
| Total margin       | 1.342 (0.223)***                   | 0.665 (0.138)*** | 0.243 (0.442)    | 0.008   | 0.024       |

Note. Robust standard errors in parentheses.  
\*\*\* $p < .01$ ; \* $p < .1$ .

*Mediation Analysis*

Our conceptual model posits that changes in financial performance after NHC are effected through one or more of the following mechanisms that we have data on: shifting market share from low- to high-quality providers such that occupancy at high-quality providers increases; better payer mix (more Medicare and/or private-pay relative to Medicaid), as represented by the point-in-time percent of residents in each payer category or the number of resident-days in each payer category. Table 3 presents our analysis of these factors as mediators. In Part A of Table 3, we show that NHC is associated with significant changes in each of these potential mediators, and several of them are significantly different for high-performing facilities relative to middle- or low-performing facilities. High-performing facilities exhibit significantly larger increases in occupancy and Medicare days and significantly larger decreases in percent Medicaid after NHC. Similarly, facilities that improve exhibit significantly larger increases in occupancy and Medicare days than the nonimproving group.

In Part B of Table 3, we assess whether the potential mediators predict financial performance (as they uniformly appear to do) and whether inclusion of the mediators in the model affects the estimate of our main NHC effects, indicating mediation. For brevity, we focus this mediation analysis on the estimation where the strongest effects were found in our main analysis, the regressions of revenues on NHC by improvement status. Although occupancy and payer mix by percent are strongly correlated with improvement, the inclusion of these variables has little effect on our NHC estimate, indicating that they do not mediate this relationship. However, including the number of resident-days by payer appears to have dramatic effects. When the number of Medicare days is included in the regressions, the magnitude of NHC is greatly diminished, and the difference by improvement becomes nonsignificant. Thus, it appears that the effects of NHC on financial status are not realized through occupancy per se but rather through changes in the type of resident admitted.

Finally, in Part C of Table 3, we focus on Medicare resident-days as our primary mediator and present the mediation results for all the financial outcomes used in our main results. Similar to what we find for revenues by improvement alone, inclusion of changes in Medicare resident-days appears to mediate effects of NHC on all financial outcomes, producing coefficients on NHC that are quite diminished relative to those presented in Table 2. As some of the differences in profit margins by improvement group remain statistically

Table 3: Mediation Analysis

| A. Impacts of Nursing Home Compare (NHC) on Potential Mediators |                                    |                    |                    |   |            |             |
|---|------------------------------------|--------------------|--------------------|---|------------|-------------|
|   | I. By Reported Score               |                    |                    | I-2. Difference-in-Differences (p-Value)  |            |             |
|   | I-1. Stratified ( $\beta$ on NHC)  |                    |                    | H versus M                                |            |             |
|   | High (H)                           | Middle (M)         | Low (L)            | H versus L                                | M versus L |             |
| Market share  |                                    |                    |                    |   |            |             |
| Occupancy   | 0.018 (0.003)***                   | 0.005 (0.001)***   | − 0.004 (0.003)    | 0.001                                     | 0.000      | 0.002       |
| Payer mix (% pt)  |                                    |                    |                    |   |            |             |
| % Medicare  | 0.030 (0.002)***                   | 0.026 (0.001)***   | 0.024 (0.002)***   | 0.163                                     | 0.110      | 0.504       |
| % Medicaid  | − 0.012 (0.003)***                 | − 0.005 (0.001)*** | 0.000 (0.003)      | 0.020                                     | 0.007      | 0.230       |
| % Other   | − 0.018 (0.003)***                 | − 0.021 (0.001)*** | − 0.024 (0.003)*** | 0.240                                     | 0.147      | 0.468       |
| Admission (ln days)   |                                    |                    |                    |   |            |             |
| ln(Medicare)  | 0.287 (0.014)***                   | 0.251 (0.006)***   | 0.231 (0.015)***   | 0.025                                     | 0.006      | 0.167       |
| ln(Medicaid)  | 0.692 (0.046)***                   | 0.696 (0.018)***   | 0.662 (0.043)***   | 0.911                                     | 0.663      | 0.483       |
| ln(other)   | 0.540 (0.039)***                   | 0.517 (0.016)***   | 0.440 (0.036)***   | 0.565                                     | 0.063      | 0.056       |
| II. By Improvement  |                                    |                    |                    |   |            |             |
|   | II-1. Stratified ( $\beta$ on NHC) |                    |                    | II-2. Difference-in-Differences (p-Value) |            |             |
|   | No Change (NC)                     |                    |                    | I versus W                                |            |             |
|   | Improved (I)                       | No Change (NC)     | Worse (W)          | I versus NC                               | I versus W | NC versus W |
| Market share  |                                    |                    |                    |   |            |             |
| Occupancy   | 0.012 (0.002)***                   | 0.004 (0.001)***   | 0.000 (0.004)      | 0.005                                     | 0.048      | 0.638       |
| Payer mix (% pt)  |                                    |                    |                    |   |            |             |
| % Medicare  | 0.026 (0.002)***                   | 0.026 (0.001)***   | 0.023 (0.003)***   | 0.937                                     | 0.272      | 0.255       |
| % Medicaid  | − 0.006 (0.002)***                 | − 0.005 (0.001)*** | − 0.006 (0.004)    | 0.635                                     | 0.786      | 0.551       |
| % Other   | − 0.020 (0.002)***                 | − 0.022 (0.001)*** | − 0.016 (0.004)*** | 0.675                                     | 0.255      | 0.133       |

Continued

Table 3. Continued

| II. By Improvement   |                   |                   |   |            |             |
|--|-------------------|-------------------|---|------------|-------------|
| II-1. Stratified ( $\beta$ on NHC)   |                   |                   | II-2. Difference-in-Differences (p-Value) |            |             |
| Improved (I)   | No Change (NC)    | Worse (W)         | I versus NC                               | I versus W | NC versus W |
| Admission (ln days)  |                   |                   |   |            |             |
| ln(Medicare)   | 0.281 (0.010)***  | 0.249 (0.006)***  | 0.007                                     | 0.000      | 0.011       |
| ln(Medicaid)   | 0.680 (0.032)***  | 0.697 (0.019)***  | 0.675                                     | 0.846      | 0.639       |
| ln(other)  | 0.522 (0.027)***  | 0.496 (0.016)***  | 0.382                                     | 0.154      | 0.043       |
| B. Impacts of Nursing Home Compare (NHC) on Revenues by Improvement Status: without and with Potential Mediators |                   |                   |   |            |             |
| By Improvement   |                   |                   |   |            |             |
| 1. Stratified  |                   |                   | 2. Difference-in-Differences (p-Value)    |            |             |
| Improved (I)   | No Change (NC)    | Worse (W)         | I versus NC                               | I versus W | NC versus W |
| Ln(revenues):  |                   |                   |   |            |             |
| Without mediators  |                   |                   |   |            |             |
| NHC  | 0.104 (0.005)***  | 0.089 (0.003)***  | 0.007                                     | 0.022      | 0.379       |
| With mediators   |                   |                   |   |            |             |
| Market share   |                   |                   |   |            |             |
| NHC  | 0.100 (0.005)***  | 0.088 (0.003)***  | .024                                      | 0.046      | 0.408       |
| Occupancy  | 0.332 (0.036)***  | 0.384 (0.025)***  |   |            |             |
| Payer mix (% pt)   |                   |                   |   |            |             |
| NHC  | 0.097 (0.005)***  | 0.082 (0.003)***  | 0.007                                     | 0.028      | 0.433       |
| % Medicare   | 0.252 (0.036)***  | 0.271 (0.023)***  |   |            |             |
| NHC  | 0.103 (0.005)***  | 0.089 (0.003)***  | 0.007                                     | 0.021      | 0.361       |
| % Medicaid   | -0.105 (0.030)*** | -0.119 (0.016)*** |   |            |             |
|  |                   | -0.126 (0.051)*** |   |            |             |



|                     |                   |                    |                  |       |       |       |
|---------------------|-------------------|--------------------|------------------|-------|-------|-------|
| NHC                 | 0.102 (0.005)***  | 0.088 (0.003)***   | 0.082 (0.009)*** | 0.007 | 0.024 | 0.401 |
| % Other             | − 0.072 (0.031)** | − 0.059 (0.017)*** | − 0.046 (0.052)  |       |       |       |
| Admission (ln days) |                   |                    |                  |       |       |       |
| NHC                 | 0.023 (0.005)***  | 0.019 (0.003)***   | 0.025 (0.007)*** | 0.203 | 0.877 | 0.322 |
| ln(Medicare)        | 0.289 (0.010)***  | 0.282 (0.007)***   | 0.294 (0.020)*** |       |       |       |
| NHC                 | 0.066 (0.006)***  | 0.044 (0.004)***   | 0.038 (0.011)*** | 0.006 | 0.096 | 0.900 |
| ln(Medicaid)        | 0.051 (0.004)***  | 0.056 (0.003)***   | 0.065 (0.008)*** |       |       |       |
| NHC                 | 0.080 (0.005)***  | 0.067 (0.003)***   | 0.052 (0.009)*** | 0.021 | 0.013 | 0.191 |
| ln(other)           | 0.049 (0.004)***  | 0.050 (0.002)***   | 0.057 (0.007)*** |       |       |       |

C. Impacts of Nursing Home Compare (NHC) on Financial Performance with Medicare Resident Days as a Primary Mediator

| I. By Reported Score |                  |                    |                  |  |            |            |
|----------------------|------------------|--------------------|------------------|--|------------|------------|
|                      | I-1. Stratified  |                    |                  | I-2. Difference-in-Differences (p-Value) |            |            |
|                      | High (H)         | Middle (M)         | Low (L)          | H versus M                               | H versus L | M versus L |
| Ln(revenues)         |                  |                    |                  |  |            |            |
| NHC                  | 0.018 (0.006)*** | 0.019 (0.003)***   | 0.031 (0.006)*** | 0.887                                    | 0.811      | 0.865      |
| ln(Medicare)         | 0.291 (0.013)*** | 0.291 (0.007)***   | 0.243 (0.012)*** |  |            |            |
| Ln(expenses)         |                  |                    |                  |  |            |            |
| NHC                  | 0.025 (0.006)*** | 0.025 (0.003)***   | 0.035 (0.006)*** | 0.799                                    | 0.902      | 0.948      |
| ln(Medicare)         | 0.263 (0.012)*** | 0.270 (0.006)***   | 0.224 (0.011)*** |  |            |            |
| Operating margin     |                  |                    |                  |  |            |            |
| NHC                  | − 0.519 (0.351)  | − 0.546 (0.139)*** | − 0.555 (0.375)  | 0.480                                    | 0.641      | 0.939      |
| ln(Medicare)         | 3.853 (0.485)*** | 3.130 (0.201)***   | 3.474 (0.512)*** |  |            |            |
| Total margin         |                  |                    |                  |  |            |            |
| NHC                  | − 0.052 (0.326)  | 0.129 (0.136)      | 0.360 (0.327)    | 0.897                                    | 0.728      | 0.562      |
| ln(Medicare)         | 3.361 (0.455)*** | 2.493 (0.203)***   | 2.673 (0.462)*** |  |            |            |

Continued

Table 3. Continued

| C. Impacts of Nursing Home Compare (NHC) on Financial Performance with Medicare Resident Days as a Primary Mediator |                  |                   |                  |           |   |            |             |       |  |
|---|------------------|-------------------|------------------|-----------|---|------------|-------------|-------|--|
| II. By Improvement  |                  |                   |                  |           |   |            |             |       |  |
| II-1. Stratified  |                  |                   |                  |           | II-2. Difference-in-Differences (p-Value) |            |             |       |  |
| Improved (I)  |                  | No Change (NC)    |                  | Worse (W) | I versus NC                               | I versus W | NC versus W |       |  |
| Ln(revenues)  |                  |                   |                  |           |   |            |             |       |  |
| NHC   | 0.023 (0.005)*** | 0.019 (0.003)***  | 0.025 (0.007)*** |           | 0.203                                     | 0.877      |             | 0.322 |  |
| ln(Medicare)  | 0.289 (0.010)*** | 0.282 (0.007)***  | 0.294 (0.020)*** |           |   |            |             |       |  |
| Ln(expenses)  |                  |                   |                  |           |   |            |             |       |  |
| NHC   | 0.023 (0.005)*** | 0.027 (0.003)***  | 0.035 (0.008)*** |           | 0.611                                     | 0.154      |             | 0.218 |  |
| ln(Medicare)  | 0.266 (0.010)*** | 0.261 (0.007)***  | 0.271 (0.018)*** |           |   |            |             |       |  |
| Operating margin  |                  |                   |                  |           |   |            |             |       |  |
| NHC   | -0.043 (0.251)   | -0.658 (0.146)*** | -1.006 (0.492)** |           | 0.009                                     | 0.069      |             | 0.661 |  |
| ln(Medicare)  | 3.487 (0.354)*** | 3.075 (0.207)***  | 4.023 (0.764)*** |           |   |            |             |       |  |
| Total margin  |                  |                   |                  |           |   |            |             |       |  |
| NHC   | 0.573 (0.231)**  | 0.041 (0.142)     | -0.339 (0.456)   |           | 0.019                                     | 0.065      |             | 0.540 |  |
| ln(Medicare)  | 2.754 (0.377)*** | 2.510 (0.203)***  | 2.955 (0.640)*** |           |   |            |             |       |  |

Note. Robust standard errors in parentheses  
\*\*\* $p < .01$ ; \*\* $p < .05$ .

significant, we conclude that changes in Medicare resident-days cannot explain the entire effect of NHC on profit margins.

#### *A Potentially Competing Explanation*

Current Medicare and some state Medicaid systems use Resource Utilization Groups (RUGs) to categorize nursing home residents into case mix categories for prospective payment (Fries et al. 1994). Important changes to the Medicare Prospective Payment System were being implemented during the time period of the study such that some RUG categories were becoming relatively more profitable (e.g., rehabilitation and extensive services) and others less profitable. Thus, changes in RUG distribution toward a more profitable payer mix could also explain improved financial performance. We investigated this possibility by examining changes in the percentage of Medicare residents admitted in seven RUG categories (i.e., rehabilitation, behavior problems, clinically complex, impaired cognition, reduced physical functions, extensive services, special care) by performance/improvement on NHC and found no significant differences. Thus, the relationships we find between performance on NHC and subsequent financial performance cannot be explained by changes in RUG distribution.

## DISCUSSION

Public reporting of quality information is an important part of recent quality improvement efforts. While the positive and negative effects of such reports on the delivery of care have been explored, little is known about providers' costs of improving performance or their return on investment under public reporting. To assess whether provider-driven quality improvement in response to public reporting is sustainable, it is important to determine whether providers benefit from delivering higher quality care under public reporting. We examine this issue in the nursing home sector.

The main findings suggest that in general the incentives inherent in public reporting appear to be working as intended in that nursing homes with high quality scores or with improved scores reap economic rewards. Specifically, improved facilities exhibited improvement in revenues after public reporting, resulting in significantly better profit margins for improving facilities. High-scoring facilities showed similar patterns, though not statistically significant. Importantly, we found that improvement counts and may lead to financial rewards even at middle levels of absolute quality scores.

Although we are unable to estimate causal effects in this analysis, we support the plausibility of a causal chain by exploring potential pathways of effect. Our mediation analyses indicate that the most important link between performing well on NHC and reaping financial rewards is an increase in Medicare admissions. This pathway has face validity in that Medicare margins are known to be higher than Medicaid margins, and facilities compete to attract both Medicare and private-pay patients; this was true long before NHC. However, performing well or improving on NHC measures may give nursing homes an extra tool in attracting the more desirable residents. Hospital discharge planners and families are often involved in placement decisions for Medicare residents, but facilities may direct their marketing toward any of these decision makers. CMS has also attempted to increase awareness of NHC among hospital discharge planners. Thus, regardless of who makes the decision, we find it plausible that NHC improves financial performance through an increased ability to attract high-margin residents.

These results raise an important policy concern that over time public reporting potentially reduces a low-scoring facility's ability to further respond to quality improvement incentives. Prior work has suggested that health care providers that serve a disproportionate share of low-income or underinsured patients are often poorly financed and have lower quality of care (Mor et al. 2004; Werner, Goldman, and Dudley 2008). Operating margins are much higher for Medicare and private-pay residents than for Medicaid residents; therefore, high Medicare and private-pay margins may be used to subsidize substantially lower Medicaid rates and margins (Konetzka et al. 2006). If the financial benefits of public reporting are targeted toward high-performing providers that are also well financed and increasingly able to attract Medicare residents, the policy of public reporting may merely direct additional resources to the providers that need these resources for quality improvement the least. As a result, low-performing providers may improve at a slower rate or remain stagnant due to lack of resources. This may further worsen the finances and potential for quality improvement at low-performing providers. In this way, public reporting may widen the disparities in quality between rich and poor providers (Werner, Asch, and Polsky 2005; Casalino et al. 2007; Konetzka and Werner 2009).

Several limitations need to be noted. First, and most important, while we measure the association between quality improvement and financial performance, whether there is a causal pathway linking these two things is not definitively known. We address this to the extent possible by investigating potential mechanisms that may lead from performance on NHC to

subsequent financial performance. Among several plausible mechanisms proposed in Figure 1, we found empirically that the strongest link between performing well on NHC and reaping financial rewards is an increase in Medicare admissions. However, we do not have a control group and do not observe the entire chain of potential events. It is also likely that there are other key mediating factors (e.g., consumer response to report card and private pay price) in the causal pathway. However, these factors are unmeasured; thus, we cannot directly test these pathways. We use a facility-level fixed-effects model to control for unobserved facility characteristics that may be correlated with NHC performance, Medicare share, and financial performance. However, it is possible that some of the changes in financial performance are attributable to omitted time-varying events that are correlated with both financial performance and the quality measures. For example, it is possible that high-quality nursing home providers invested in greater capability to provide more lucrative postacute care during the time period of the study, thereby increasing both Medicare share and revenues, and that NHC was either irrelevant or incidental to these efforts.

Second, we do not know whether providers actually engage in quality improvement efforts in order to improve performance. Improvement may also be due to potential dysfunctional responses such as cream skimming and selective investment in publicly reported measures (Werner and Asch 2005; Mukamel et al. 2009). Thus, it is possible that the NHC quality scores may not accurately reflect true quality. However, our intent in this analysis is to assess the financial consequences of scoring well or improving on NHC regardless of whether the scores reflect true quality.

Third, the scope of this study is limited. We focus on a business case for quality which considers only the perspective of providers. This constrained perspective contrasts the business case with the economic case and the social case (Reiter et al. 2007). An investment that improves quality may have different financial consequences for providers, payers, individual patients, and society. Health care providers may be reluctant to implement improvements if better quality is not accompanied by better payment or improved margins, or at least equal compensation (Leatherman et al. 2003). In addition, we analyzed the effects of public reporting on financial performance over a relatively short time period (i.e., the first 3 years after public reporting). As long-term effects may be different from initial effects, future research should revisit this issue and examine whether these trends continue over a longer period.

Despite these limitations, the results of this study provide the first available evidence on the impact of public reporting on financial performance, and

thus they provide important policy implications. First, high performance or improvement on quality measures may lead to economic rewards for providers in the presence of publicly reported quality. This is very positive for public reporting. It appears possible for providers to receive a return on investment in quality improvement even if the highest threshold of quality is not achieved. On the margin this may motivate providers to invest in improving quality. Second, improvement on quality measures matters, but the absolute level of reported quality also matters. Low-quality providers that face the most severe resource constraints—those who predominantly care for poor and underserved populations—may be less likely to undertake quality improvement because incremental improvements in quality are not rewarded at that level. If quality improvement is concentrated in highly resourced facilities, the quality gap between facilities may widen. Safeguards may be necessary to ensure that low-quality facilities have the necessary resources to improve.

## ACKNOWLEDGMENTS

*Joint Acknowledgment/Disclosure Statement:* This research was funded by a grant from the Agency for Healthcare Research and Quality (R01 HS016478-01). Rachel M. Werner is supported in part by a VA HSR&D Career Development Award. An earlier version of the study was presented at the 2009 Academy-Health Annual Research Meeting.

*Disclosures:* None.

*Disclaimers:* None.

## REFERENCES

- Arling, G., C. Job, and V. Cooke. 2009. "Medicaid Nursing Home Pay-for-Performance: Where Do We Stand?" *Gerontologist* 49 (5): 587–95.
- Bazzoli, G. J., J. P. Clement, R. C. Lindrooth, H.-F. Chen, S. K. Aydede, B. I. Braun, and J. M. Loeb. 2007. "Hospital Financial Condition and Operational Decisions Related to the Quality of Hospital Care." *Medical Care Research and Review* 64 (2): 148–68.
- Casalino, L. P., A. Elster, A. Eisenberg, E. Lewis, J. Montgomery, and D. Ramos. 2007. "Will Pay-for-Performance and Quality Reporting Affect Health Care Disparities?" *Health Affairs* 26 (3): w405–14.
- Castle, N. G. 2005. "Does Quality Pay for Nursing Homes?" *Journal of Health and Social Policy* 21 (2): 35–51.

- . 2009. "The Nursing Home Compare Report Card: Consumers' Use and Understanding." *Journal of Aging and Social Policy* 21 (2): 187–208.
- Castle, N. G., J. Engberg, and D. Liu. 2007. "Have Nursing Home Compare Quality Measure Scores Changed over Time in Response to Competition?" *Quality and Safety in Health Care* 16: 185–91.
- Fries, B. E., D. P. Schneider, W. J. Foley, M. Gavazzi, R. Burke, and E. Cornelius. 1994. "Refining a Case-Mix Measure for Nursing Homes: Resource Utilization Groups." *Medical Care* 32 (7): 668–85.
- Grabowski, D. C. 2001. "Medicaid Reimbursement and the Quality of Nursing Home Care." *Journal of Health and Economics* 20 (4): 549–69.
- Kane, N. M., and S. A. Magnus. 2001. "The Medicare Cost Report and the Limits of Hospital Accountability: Improving Financial Accounting Data." *Journal of Health Politics, Policy and Law* 26 (1): 81–105.
- Konetzka, R. T., E. C. Norton, P. D. Sloane, K. E. Kilpatrick, and S. C. Stearns. 2006. "Medicare Prospective Payment and Quality of Care for Long-Stay Nursing Facility Residents." *Medical Care* 44 (3): 270–6.
- Konetzka, R. T., and R. M. Werner. 2009. "Disparities in Long-Term Care: Building Equity into Market-Based Reforms." *Medical Care Research and Review* 66 (5): 491–521.
- Leatherman, S., D. Berwick, D. Iles, L. S. Lewin, F. Davidoff, T. Nolan, and M. Bisognano. 2003. "The Business Case for Quality: Case Studies and an Analysis." *Health Affairs* 22 (2): 17–30.
- McCue, M. J., B. A. Mark, and D. W. Harless. 2003. "Nurse Staffing, Quality, and Financial Performance." *Journal of Health Care Finance* 29 (4): 54–76.
- Mor, V., J. Angelelli, R. Jones, J. Roy, T. Moore, and J. Morris. 2003. "Inter-Rater Reliability of Nursing Home Quality Indicators in the U.S." *BMC Health Services Research* 3 (1): 20.
- Mor, V., J. Zinn, J. Angelelli, J. M. Teno, and S. C. Miller. 2004. "Driven to Tiers: Socioeconomic and Racial Disparities in the Quality of Nursing Home Care." *Milbank Quarterly* 82 (2): 227–56.
- Morris, J. N., T. Moore, R. Jones, V. Mor, J. Angelelli, K. Berg, C. Hale, S. Morris, K. M. Murphy, and M. Rennison. 2003. *Validation of Long-Term and Post-Acute Care Quality Indicators*. Baltimore, MD: Centers for Medicare and Medicaid Services.
- Mukamel, D. B., H. Ladd, D. L. Weimer, W. D. Spector, and J. S. Zinn. 2009. "Is There Evidence of Cream Skimming among Nursing Homes Following the Publications of the Nursing Home Compare Report Card?" *Gerontologist* 49 (6): 793–802.
- Mukamel, D. B., W. D. Spector, J. S. Zinn, L. Huang, D. L. Weimer, and A. Dozier. 2007. "Nursing Homes' Response to the Nursing Home Compare Report Card." *Journal of Gerontology: Social Sciences* 62B (4): S218–5.
- Mukamel, D. B., D. L. Weimer, W. D. Spector, H. Ladd, and J. S. Zinn. 2008. "Publication of Quality Report Cards and Trends in Reported Quality Measures in Nursing Homes." *Health Services Research* 43 (4): 1244–62.
- Norton, E. C. 2000. "Long-Term Care." In *Handbook of Health Economics*, edited by A. Cuyler and J. Newhouse, pp. 955–94. Amsterdam: Elsevier Science.

- Reiter, K. L., K. E. Kilpatrick, S. B. Greene, K. N. Lohr, and S. Leatherman. 2007. "How to Develop a Business Case for Quality." *International Journal for Quality in Health Care* 19 (1): 50–5.
- Weech-Maldonado, R., G. Neff, and V. Mor. 2003. "The Relationship between Quality of Care and Financial Performance in Nursing Homes." *Journal of Health Care Finance* 29 (3): 48–60.
- Werner, R. M., and D. A. Asch. 2005. "The Unintended Consequences of Publicly Reporting Quality Information." *Journal of American Medical Association* 293 (10): 1239–44.
- Werner, R. M., D. A. Asch, and D. Polsky. 2005. "Racial Profiling: The Unintended Consequences of Coronary Artery Bypass Graft Report Cards." *Circulation* 111 (10): 1257–63.
- Werner, R. M., L. E. Goldman, and R. A. Dudley. 2008. "Comparison of Change in Quality of Care between Safety-Net and Non-Safety-Net Hospitals." *Journal of American Medical Association* 299 (18): 2180–7.
- Werner, R. M., R. T. Konetzka, E. A. Stuart, E. C. Norton, D. Polsky, and J. Park. 2009. "Impact of Public Reporting on Quality of Postacute Care." *Health Services Research* 44 (4): 1169–87.
- Zinn, J. S., W. D. Spector, L. Hsieh, and D. B. Mukamel. 2005. "Do Trends in the Reporting of Quality Measures on the Nursing Home Compare Web Site Differ by Nursing Home Characteristics?" *Gerontologist* 45 (6): 720–30.

## SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2: Full Regression Results of Table 2: Impacts of Nursing Home Compare (NHC) on Financial Performance.

Appendix SA3: Complete Results of Table 3-C. Impacts of Nursing Home Compare (NHC) on Financial Performance with Potential Mediators.

Appendix SA4: Impacts of Nursing Home Compare (NHC) on Financial Performance: Post-NHC (i.e., 2003-2005) versus Delayed Post-NHC by One Year (i.e., 2004-2005).

Appendix SA5: Impacts of Nursing Home Compare (NHC) on Financial Performance: Based on Deficiency and Staffing as Quality Measures.

Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.